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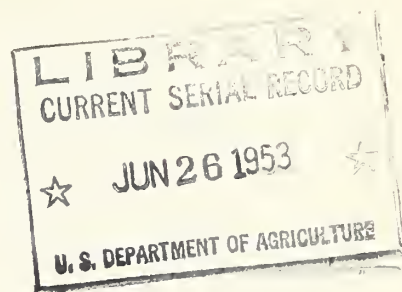
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R E P O R T

of the

EIGHTH NORTHEASTERN CORN IMPROVEMENT CONFERENCE

New York City
January 30-31, 1953



Reported by
William R. Findley, Jr., Acting Secretary

Division of Cereal Crops & Diseases
Bureau of Plant Industry, Soils, and Agricultural Engineering
Plant Industry Station, Beltsville, Md.
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REPORT OF THE EIGHTH NORTHEASTERN CORN IMPROVEMENT CONFERENCE

New York City, New York
January 30-31, 1953

Reported by William R. Findley, Jr., Acting Secretary

AFTERNOON SESSION, FRIDAY, JANUARY 30

The meetings of the Eighth Northeastern Corn Improvement Conference were held in the Hotel New Yorker, New York City. Arrangements for the conference were made by H. M. Yegian and H. L. Everett.

The afternoon session was called to order by Chairman H. M. Yegian at 1:15 p. m. Dr. Yegian briefly reviewed the program outlined for this session of the Conference. The first portion of the program was devoted to a short business meeting.

Business Meeting

The main item for consideration concerned the question of extending invitations to Conference membership to corn breeders associated with private organizations located in the northeastern region.

Dr. Everett read a letter from Dr. L. L. Huber addressed to Dr. Yegian regarding extending invitations to corn breeders with cooperative organizations. Dr. Huber was unable to attend the meetings.

Dr. Yegian then read a letter received from Dr. R. G. Wiggans, who also was absent concerning his views regarding inviting other individuals to become members of the Northeastern Corn Improvement Conference.

1/ Associate Agronomist, Division of Cereal Crops and Diseases,
Plant Industry Station, Beltsville, Maryland.

Members present were asked to express their views.

It was the unanimous opinion of those present and expressed in Dr. Huber's and Dr. Wiggans' letters that certain restrictions would be required to keep the Conference membership on a common interest level. All possible precautions should be exercised to avoid the possibility of creating a situation in which a free exchange of ideas would not occur.

Dr. Wernham

MOVED: as amended - that corn breeders of commercial companies of the Northeastern region who are dealing exclusively in open formula hybrids and are doing corn breeding work be admitted by invitation from the current executive committee to membership in the Northeastern Corn Improvement Conference.

Seconded and passed

The remaining portion of the afternoon session was devoted to the presentation and discussion of papers by J. E. Baylor, G. H. Stringfield, D. F. Jones, W. L. Heltiwanger, R. S. Snell, D. W. Barton, C. C. Wernham, L. F. Randolph and W. R. Singleton. Brief summaries of most of these papers follow.

A COMPARISON OF SOURCES OF WF9 x 38-11 FOUNDATION
SEED

J. C. Anderson and J. E. Baylor

WF9 x 38-11 is the most important single cross seed parent presently in use in New Jersey. It is combined with J47 x B42 to produce seed of N. J. #7.

Despite the outstanding performance of the final hybrid, seed yields of salable flats with WF9 x 38-11 have been very disappointing. The high percentage of narrow flats compared with large and medium has also caused concern.

Since this single cross is not produced in New Jersey, we felt that perhaps seed from a source other than the one presently used might perform in a somewhat superior manner. Thus, in the spring of 1952, seed of WF9 x 38-11 was obtained from 8 sources throughout its area of adaptation and compared for: (1) Yield, (2) % Flat grade (3) % moisture (4) % off-type plants (5) % broken plants, and (6) % stalk rot. The following discussion is based on the reports obtained. Since these data are for one year only they are presented as preliminary only. However, since other persons have indicated a similar problem, it was felt a brief report would be in order.

Seed of WF9 x 38-11 from the 8 seed sources was planted in duplicate in 3 production fields in the state and also in a replicated trial at New Brunswick.

The summary of results of the 3 production field trials are reported in Table 1.

As shown in Table 1 there was considerable variability in the performance of the various seed sources. However, the only two characteristics showing a significant difference were moisture and off-type plants.

The comparable performance of the 8 sources at the 3 locations is presented in Table 2.

As indicated in Table 2, differences were significant at the 1% level for all characteristics studied. Cooperator G had the highest average yield, highest % of flat grade, lowest % off-type plants and a comparatively small percentage of broken plants and stalk rot.

A breakdown of the flat grade percentages of the 8 seed sources at the 3 locations is presented in Table 3.

Cooperator G produced not only the highest percentage of flat grades but he also had a higher percent of large and medium flat grades which are more desired by the trade.

An analysis similar to that in Table 1 was made for the replicated trial at New Brunswick. In this trial there were significant differences in the following characteristics.

Percent off-type ears
Percent broken plants
Percent stalk rot

There was no significant differences between sources for yield, percent flat grade and moisture.

This study, very preliminary in nature, leaves many questions to be answered.

The main differences were not between seed sources but between locations. Time of planting, fertility level and cultural practices were variable factors used by the 3 cooperators. Only rate of planting was constant for the 3 locations.

TABLE 1

SUMMARY OF 8 SEED SOURCES OF WF9 x 38-11, 1952
(3 locations)

Seed Source	Yield Bu.	% Flat Grade	% Moisture	% Off-Type Plants	% Broken Plants	% Stalk Rot
1	77.8	76	28	10	27	46
2	88.2	70	27	4	14	46
3	89.6	66	28	8	17	41
4	83.1	73	27	8	11	33
5	84.9	71	26	4	18	31
6	82.8	60	29	8	17	31
7	77.4	70	29	13	20	32
8	74.9	64	29	10	15	39
Mean	82.3	69	28	8	17	39
LSD 5%	----	--	2	6	--	--

TABLE 2

THE AVERAGE PERFORMANCE OF 8 SOURCES OF WF9 x 38-11
COMPARED AT 3 LOCATIONS

Coop-erator	Yield Bu./A	% Flat Grade	% Moisture	% Off-Type plants	% Broken plants	% Stalk rot
S	66	71	23	8	29	60
H	82	58	31	13	11	22
G	99	78	30	6	14	34
LSD 5%	Yes	6	2	3	7	7
LSD 1%	Yes	8	3	5	10	9

TABLE 3
BREAKDOWN OF THE FLAT GRADE PERCENTAGES OF
8 SEED SOURCES (WF9 x 38-11) AT 3 LOCATIONS

SEED SOURCE	LARGE FLATS				MEDIUM FLATS				SMALL FLATS			
	Cooperator				Cooperator				Cooperator			
	S %	H %	G %	Ave. %	S %	H %	G %	Ave. %	S %	H %	G %	Ave. %
1	6	6	9	7	23	23	31	26	44	43	39	42
2	6	7	9	8	27	23	32	27	40	22	41	34
3	6	9	12	9	26	24	34	28	41	20	28	30
4	6	9	13	9	29	29	43	34	36	30	24	30
5	7	6	9	7	24	21	31	25	40	39	36	38
6	7	8	9	8	23	21	35	26	29	13	30	24
7	5	10	9	8	23	26	28	26	45	27	36	36
8	7	8	10	8	25	21	35	27	38	17	29	28
Ave.	6	8	10		25	23	33		39	26	33	

*THE RESPONSE OF CORN HYBRIDS TO LEVELS OF
SOIL PRODUCTIVITY*

G. H. Stringfield

Slides were shown showing graphs previously published. The graphs were interpreted as indicating that (a) corn hybrids may respond differentially to varying fertility levels, (b) the differential response to fertility levels is decidedly less than it is to varying seasons, (c) much of the differential response to fertility levels is accounted for in the excess yield of late hybrids over early hybrids being greater as fertility level is higher.

1. Stringfield, G. H., and H. L. Pfaff. A Summary of Corn Performance Experiments in Ohio: 1943 to 1949. Ohio Agr. Expt. Sta., Research Circular 14. 1951.

2. Stringfield, G. H., and R. M. Salter. Differential Response of Corn Varieties to Fertility Levels and to Seasons. Jour. Agr. Research, V. 49(11): pp. 991-1000. 1935.

† RESTORATION OF POLLEN FERTILITY TO STERILE STED PARENTS †

D. F. Jones

Additional evidence has shown clearly that the different sources of cytoplasmic pollen abortion behave differently in crosses with the same inbreds. Many lines that cannot be sterilized satisfactorily by one source can be sterilized completely by another and maintained in a sterile condition for successive generations in backcrossed lines and in first generation crosses. On the other hand, inbreds that cannot restore fertility to a cytoplasmic sterile line of one source may be able to restore fertility to the same inbred line when sterilized by a different source. This shows that the various sources of cytoplasmic sterility differ in their interaction with the same genomes. Five different sources are being studied.

All sterile lines that have been converted to a uniform type and maintained by backcrossing in successive generations (some for eight generations) have shown a few plants returning to partial fertility. These plants that are apparently not outcrosses occur with low frequency, usually not more than 1 in 800 to 1000. No completely fertile plant has been found so far but they produce sufficient pollen to be maintained by self-fertilization. The offspring are variable in the number of anthers exposed and in the amount of normal pollen produced. Some individuals return to complete sterility but, so far, none have been restored to complete fertility. These partially fertile plants cannot be attributed to outcrossing and must be due either to variation in the cytoplasmic state or mutation to pollen restoring genes. These possibilities are being tested by crossing by normally fertile lines free from restoring genes and on to completely sterile lines of the same genic constitution.

† THE EFFECT OF TEMPERATURE, INCUBATION PERIOD, DISEASE ORGANISMS, and CULTURAL MEDIA ON THE GERMINATION OF SIX CORN HYBRIDS †

W. L. Haltiwanger, C. C. Wernham and L. L. Huber

The purpose of this study was to determine the relative value of certain variables as criteria for cold-testing corn hybrids. These variables included the following:

- (a) Four media
- (b) Eight organism treatments
- (c) Three temperatures
- (d) Three Periods of incubation
- (e) Six corn hybrids

MATERIALS AND METHODS

Six untreated commercial hybrids were used in this study. These hybrids had previously been tested in field soil and rated as to their ability to germinate at cold temperatures. These hybrids were rated as two low resistant, two medium resistant, and two high resistant. The four media in which these hybrids were tested were washed river bottom sand, soil in which corn had been grown for three years, sterilized soil from the same field, and vermiculite.

Twenty-five seeds were placed in seven ounce wax coated cardboard cups, the bottom of which had been perforated to facilitate drainage.

Eight organism treatments were used for each hybrid and each medium. These organism treatments consisted of the following:

1. Check (No inoculum or sterile grain)
2. Pythium debaryanum, P. arrhenomanes, P. ultimum, and P. irregulare.
3. Gibberella zeae.
4. Diplodia zeae.
5. Pythiums and Gibberella zeae.
6. Pythiums and Diplodia zeae.
7. G. zeae and D. zeae.
8. Pythiums, G. zeae and D. zeae.

The organisms were added to the media by the dried grain culture technique. A sufficient amount of inoculum to produce infection was added on top of the seeds in each cup for each organism treatment. Each cup was then filled to a constant level with a medium, which placed the seeds one and one-half inches deep. Sufficient water was added to obtain a level of field capacity.

After the cups were prepared in all possible combinations for the hybrids, organism treatments, and media, they were completely randomized and placed in a refrigerator equipped with a circulating fan and a thermostat which maintained an air temperature within ± 20°F.

The cold exposure schedule consisted of three temperatures; namely, 45°, 50°, and 55°F. for periods of 7, 10, and 14 days at each temperature. Two replications of each treatment were made.

During the incubation period in the refrigerator, wet paper towels were kept over the cups in order to reduce loss of moisture from the media by evaporation.

At the end of the prescribed period, the cups were removed from the refrigerator to an artificially illuminated room at a temperature of 70° to 75°F. and incubated for one week. At the end of one week, a total stand count was made and the data analyzed.

RESULTS

Graphic presentation of the significant interactions will be presented instead of each source of variation in the combined analysis of variance.

The significant second order interaction of Media X Durations of Incubation x Temperatures shows that the duration of incubation did not have the same relative effect on germination for all media at all temperatures. For example, between 7 and 10 days significance was found between 45° and 50°F. for sand, 50° and 55°F. for sterilized soil, and 45° and 55°F. for vermiculite. There was no significance when soil was the medium.

The interaction of Organism treatments x Durations of Incubation illustrates that all organism treatments did not have a similar effect on germination for all durations of incubation. The significant interaction was caused primarily by the different response of organism treatments containing G. zeae for the three periods of incubation, while organism treatments not containing G. zeae responded in a similar manner to all periods of incubations. The treatment containing Pythiums, G. zeae, and D. zeae was not significantly different from treatments not including G. zeae. This suggests the possibility of an antagonistic action among the organisms constituting this treatment.

The highest germination means, with the exception of the check treatment, was produced by the D. zeae treatment, due to the fact that D. zeae is most active at temperatures above those used in this study. The germination means for the Pythiums and G. zeae treatment was not significantly different from the G. zeae treatment suggesting that the Pythiums had relatively little effect on germination in combination with G. zeae.

The interaction of Organism Treatments X Temperatures was highly significant. In general, the germination means ranked the same for all organism treatments at all temperatures, with germination decreasing as temperatures increased. An exception to this is where a marked reduction in germination occurred at 55°F. for organism treatments Pythiums and Pythiums and D. zeae. This indicated that Pythiums express their greatest pathogenicity at 55°F.

The interaction of Organism Treatments X Durations of Incubation X Temperatures at 45°F. was found only between 7 and 14 days. Increasing the duration of incubation from 7 to 10 days or from 10 to 14 days was not significant, however, the difference between 7 and 14 days was enough to be significant. The same interaction at 50°F. was also significant between 7 and 14 days. This difference was largely due to the organism treatments containing G. zeae and those treatments not containing G. zeae. At 55°F. highly significant differences were obtained

between 7 and 10 days and 7 and 14 days for most of the organism treatments. This interaction was caused by the marked reduction in germination means for 10 and 14 days for most of the organism treatments as compared to the germination means for organism treatments for the 7 day period of incubation.

The interaction of Media X Organism Treatments was highly significant. Significance in germination means was manifested between all media except sterilized soil and vermiculite. This is largely due to the fact that the germination in field soil with no organisms added was quite similar to germination in this medium when inoculum was added, whereas, the germination means in the other media with no inoculum were markedly higher than the germination means in these media with inoculum.

The interaction of Hybrids X Temperatures was significant. In general, as the temperatures increased the germination means decreased.

The interaction of Hybrids X Media was highly significant. This was due to the fact that in most cases a wide difference occurred between germination in field soil, in which the lowest germination was produced, and all other media. This suggests that the population of the organisms in the soil (natural and added) was greater than what was added to the other media. Since little difference was found between the other media, it can be surmised that under the conditions of this study, media per se had little effect on germination.

In conclusion, it has been shown that the most critical cold test was obtained when corn was planted in field soil and incubated at 55°F for 14 days.

WHY NOT A MEMORIAL TO THE PIONEERS IN HYBRID CORN BREEDING?

R. S. Snell

With a production of 3 billion bushels and a value of 5 billion dollars U. S. corn now owes, if our estimates are correct, 1 billion dollars annually to hybrid breeding. This is sometimes estimated as adequate to finance all agricultural research in the U. S. right up to the present date.

Then why not a national memorial to the pioneers of hybrid corn, something in keeping with the character of those pioneers? Possibly a national laboratory devoted to research comparable to that which they did with maybe one room or one section to hold the reminders of those early days -- the records, publications, photographs.

Among all the beneficiaries of that early research isn't there the means to finance such a memorial?

If there is a will to and a way for obtaining such a memorial, what is the best way to start?

+ THE MASS PRODUCTION OF BLIGHT RESISTANT CORN +

C. C. Wernham

For resistance to Helminthosporium turcicum, crosses made between very resistant lines with a rating of 0.5 to 1.0 and very susceptible lines with a rating of 5.0 yield in the F₂ about 1 plant per 1000 of a rating of 0.5 or 1 and 2,3 plants of an acceptable rating of 2.0.(3). Under our conditions we cannot detect the desirable plants until September 15 or later. This means that most of the nursery is discarded. There should be a more productive method of producing blight resistant corn.

Certain cultures turned over to the agronomists for 1949 top-crossing were planted for yield test in 1950. This meant that by 1951 there would be available for second cycle breeding some blight resistant lines from the 1950 test. These could be used in 3-way crosses of the type (RxS)R¹.

For the (RxS) crosses, (C103x40B), C103 and two of our resistant lines of the origin M14 x K155 and (Oh04xNC34) 471 were used as resistant parents with the susceptible lines I205, W23, Ill.A, Osh20, WF9, L317, Oh28 and Oh26. The H. turcicum resistant parents are also quite resistant to Helminthosporium maydis. The following crosses and some reciprocal crosses were made constituting the (RxS) group.

- | | | |
|--|--|---|
| <p>1. <u>(C103x40B) (RxS)</u></p> <p>x C103</p> <p>x (M14xK155)</p> <p>x (Oh04xNC34) A71</p> | <p>2. <u>C103 (R)</u></p> <p>x (Oh04xNC34) A71</p> <p>x (M14xK155)</p> <p>x A</p> <p>x W23</p> <p>x I205</p> | <p>3. <u>M14xK155 (R)</u></p> <p>x (Oh04xNC34) A71</p> <p>x I205</p> <p>x Osl420</p> <p>x WF9</p> <p>x W23</p> <p>x Oh26</p> <p>x Oh28</p> <p>x A</p> <p>x L317</p> |
|--|--|---|
4. (Oh04xNC34) A71 (R)
- x A
- x W23
- x Osl420
- x I205
- x L317

This group contains a few (RxR) single and (RxS)R back crosses.

In 1951 the nursery was arranged so that these crosses were planted in alternate blocks with certain inbreds varying in resistance from 1.0-3.0. The inbreds were those which were screened in the 1950 top cross tests, plus those that ranged on the borderline of acceptable yield but which had other qualities e.g. stalk rot resistance and earliness or dark green foliage which recommended their use.

In addition remnant top-cross seed of high yielding cultures were planted as (RxS) crosses.

The 1951 season was very dry. As a result fewer crosses were made with the later lines. M14xK155 enjoyed wider usage as a male parent because of its earliness. We did not obtain a solitary cross with K155 itself, but a late rain permitted a few crosses with Jenkins' recovered lines. In all, 906 random crosses were made but 215 were discarded, chiefly because of smut and stalk-rot. The singles composed of Osl420 and W23 were greatly reduced by stalk-rot.

Late August and September moisture allowed a build up of H. turcicum but H. maydis did not develop sufficiently to permit ratings.

The 691 remaining crosses were divided into two groups, those for which the female parent rated 3.0 or less, and those with a higher rating. The 425 ears from plants rating 3.0 or less were planted in 10 foot single rows in 1952 on May 7 and 8.

- It rained 24 of the 31 days in May making a wet cold spring. It took corn 15-17 days to appear above ground and stands were severely reduced. I believe it was the thinnest nursery of hybrid material I have ever had. All crosses were selfed.

This material was given our usual comprehensive treatment for root rots, smut, blight and stalk rot (1,2). The season was dry but not as lacking in moisture as 1951. Both H. turcicum and H. maydis developed well although their appearance was somewhat delayed. Frost did not occur until October 4. Stalk rot was not severe but kernel smut was severe.

Except for early material, harvesting was limited to plants having a H. turcicum rating of 2.0 or less, and only those ears were taken which exhibited good kernel characteristics. Ears were dried 100-110°F, and shelled.

The results are tabulated below and are presented as individual contributions of each original resistant line or cross.

Table I.

Summary of blight resistant cultures harvested from 1952 corn disease nursery at State College, Pa. Each section of the table lists the resistant recoveries from each original resistant parent chosen in 1950.

1. C103x40B - All combinations.

		<u>H. turcicum</u> rating		0.5		1.0		2.0		3.0		Total
		** <u>H. maydis</u> rating		-	+	-	+	-	+	-	+	
Days	75 - 80		1	0	10	1	9	0	2	0		23
to	81 - 85		7	3	55	6	27	1	1	0		100
Silk	86 - 90		11	0	64	15	26	2	-	-		118
	91 - 95		12	3	51	7	7	-	-	-		80
	96 -		4	1	7	-	1	-	-	-		13
Total			35	7	187	29	70	3	3	0		334

2. C103 - all remaining combinations.

75 - 80	-	-	2	1	15	1	1	-	20
81 - 85	1	1	8	1	36	3	-	-	50
86 - 90	2	-	31	9	36	7	-	-	85
91 - 95	2	1	13	2	17	1	-	-	26
96 -	-	-	2	1	1	-	-	-	4
Total	5	2	56	14	105	12	1	0	185

** H. maydis was rated (-) = slight, and (+) = objectionable amount of infection.

Table 1. (Contd.)

		0.5		1.0		2.0		3.0		Total
		-	+	-	+	-	+	-	+	
3. M14 x K155 - all remaining combinations.										
75 - 80		-	-	5	9	33	30	18	3	97
81 - 85		1	5	26	34	95	35	5	2	203
86 - 90		3	5	18	30	62	10	-	-	128
91 - 95		4	8	15	31	28	9	-	-	95
96 -		2	-	5	4	2	-	-	-	13
Total		10	18	69	107	220	84	23	5	536

4. (Oh04xNC34)A71 - all remaining combinations

75 - 80	3	1	5	5	39	16	8	4	81
81 - 85	1	1	17	20	54	39	4	2	138
86 - 90	1	0	21	22	36	14	1	-	95
91 - 95	1	2	21	3	33	5	-	-	65
96 -	-	1	2	6	5	-	-	-	14
Total	6	5	66	56	167	74	13	6	393

5. Top crosses - all remaining combinations

75 - 80	-	2	2	3	21	5	3	-	36
81 - 85	1	2	13	19	24	6	1	-	66
86 - 90	2	1	17	8	21	2	-	-	51
91 - 95	-	-	8	5	9	-	-	-	22
96 -	2	-	6	-	1	1	-	-	10
Total	5	5	46	35	76	14	4	0	185

Grand Total 1 + 2 + 3 + 4 + 5

* 75 - 80	4	3	24	18	117	52	32	7	257
81 - 85	11	12	119	80	236	84	11	5	558
86 - 90	19	6	151	84	181	35	1	-	477
91 - 95	19	14	108	48	94	15	-	-	298
96 -	8	2	22	11	10	2	-	-	55
Total	61	37	424	241	638	188	44	12	1645

*Since corn took 15 - 17 days to emerge, due to cold wet weather, about 8 - 10 days should be subtracted for normal silking dates.

** H. maydis was rated (-) = slight, and (+) = objectionable amount of infection.

Summary

1. The data presented show that inbred lines of corn of intermediate resistance or complete susceptibility may profitably be employed in a leaf blight resistance program, provided that there are available a few lines of a higher degree of resistance, with which crosses may be made.

2. The data also indicate that crosses of the type (RxS) R^1 or (RxS)R produce hybrids of a desirable order of resistance in superior numbers to (RxS) crosses selfed.

References

1. Wernham, C.C. Techniques for inoculating corn with disease producing organisms. (Revised.) The Pennsylvania State College Agr. Expt. Sta. Report 5. 1949.
2. Ibid. Cold testing of corn. The Pennsylvania State College Agr. Exp. Sta. Report 47. 1951.
3. Ibid. Disease resistance and early testing of maize. Science 116:57-58. 1952.

Mass producing blight resistant Maize.

It is proposed to select those entities above rating 0.5 and 1.0 for H. turcicum and resistant to H. maydis (-) and to divide them into 3 classes of maturity.

- a. up to 83 days to silk.
- b. 84 - 90 days to silk.
- c. 91 or more days to silk.

For purpose of discussion let us assume resistant synthetics in genetic equilibrium.

I.

A. First year.

1. (a) Select 60 inbreds, or 60 ears of standard hybrids or open pollinated varieties and plant in synthetic field for top-crossing, using the synthetic as the male parent.
- (b) inoculate female parents for smut and stalk rots, discarding susceptibles at end of season.

B. Second year.

2. Test inbreds, hybrid or variety ears for general combining ability; save the remnant seed.

C. Third year.

3. (a) Remnant top-cross seed of entries having good general combining ability is replanted in synthetic field and detasselled. This constitutes backcross one to synthetic.

- (b) Inoculate 3(a) material with smut, H. turcicum, H. maydis and stalk-rot organisms. Select most resistant plants prior to and at harvest time.

D. Fourth year.

4. Self selections made previous year 3(b) in disease nursery saving only the highly resistant material.

E. Fifth year.

- I. Re-constitute the synthetic from selfed material of 4.

II. Possible variations of the plan.

1. Additional inbreds, hybrids and varieties may be introduced at any time in the scheme and used to reconstitute a new synthetic provided they have been crossed at least once with the immediately preceding version of the synthetic.
2. Inbreds and hybrids having a blight rating of 3.0 or less may be selfed and selected and used to reconstitute the synthetic in the year following the top-cross test. The genetic basis would be increased 50% instead of the 25% following one backcross.

III. Uses of the synthetic.

1. It provides an ever broadening genetic basis of blight resistant material.
2. Inbreds may be derived from it without laborious pathological techniques, thereby saving expense, by

(a) inbreeding

(b) extraction of monoplids.

If this proposal meets with scientific acceptance it shall be part of the pathological program to maintain the synthetic. Agronomist would be expected to test inbreds, hybrids, etc. top crossed for general combining ability.

✕ TETRAPLOID CORN

✓
L. A. Randolph

A selected strain of tetraploid corn derived from heat treatment of combinations of inbred lines of Lucas Favorite, Illinois A, Webbers Dent and Spanish Flint has increased in fertility and productivity during the past 15 years. The plants are sturdier than their parthenogenetic diploid sibs, have stiffer stalks, less subject to lodging and appreciably larger ears and kernels of higher nutritional value.

The fertility of the better ear-row progenies ranges from about 60 to 95 per cent with a mean of 80 to 85 per cent. A more stable cytological behavior consisting of an increased frequency of bivalent synapsis of the chromosomes has developed in this tetraploid strain during the past ten years. It is planned to use this strain as a topcross parent in tests of various doubled single crosses.

Representative ears of tetraploid and derived diploid plants were exhibited for illustrative purposes, also ears from $2n \times 4n$ and reciprocal crosses to demonstrate the high degree of cross incompatibility of tetraploid and ordinary diploid corn.

MORNING SESSION, SATURDAY, JANUARY 31

The meeting was called to order by Vice Chairman H. L. Everett at 9:00 a.m. Dr. Everett immediately called for reports from standing committees.

Report of the Committee on Uniform Tests of Double Crosses

H. L. Everett reporting for the Committee stated that New York and Pennsylvania cooperated in a double cross test in 1952. All entries except the standards consisted of experimental hybrids. A copy of the results will be circulated to interested conference members.

Reports of the Committees on Uniform Tests of Single Crosses

H. M. Yegian reported for the Committee on Uniform Tests of W240 Maturity. Attempted all combination single crosses among 10 lines was unsatisfactory due to complete failure of some of the lines. No seed was produced and no crosses are planned for 1953.

H. L. Everett reported as follows for the Committee on Tests of W355, W412 and Ohio M15 Maturities.

W355 Maturity. No crosses of this maturity were produced for 1953 tests.

W412 Maturity. Seed for all combination single cross tests was produced by H. L. Everett and L. L. Huber. The following 9 inbred lines were involved.

NY3	PaB172	A221
Pa11	Ill. R53	A375
Pa32d	A218	SD105

Tests were tentatively assigned as follows:

Pennsylvania	1 or 2
New York	1 or 2
Eastern States	1

M15 Maturity. No crosses were produced for testing in 1953.

D. F. Jones reported for the Committee on Ohio K24 and Iowa 4059 Maturities. No crosses were produced for tests in either of these maturities.

Dr. Jones pointed out that these groups have been pretty well neglected. In view of their general adaptability to this area more attention should be given to them.

R. G. Rothgeb reported for the Committee on U.S. 13 and Ill. 448 Maturities. No crosses were made of Ill. 448 maturity.

U. S. 13 Maturity. Uniform single cross tests were conducted by Connecticut, Delaware, Maryland, New Jersey and Pennsylvania in 1952. These tests were arranged in 7 x 7 lattice squares with 49 entries. Seed was composited from New Jersey and Maryland and distributed by J. C. Anderson of New Jersey. Inbreds involved in the 45 singles were:

Pa830	Oh29	JL7
Oh45	38-111B	J7-269
WF9	Pa92D	Hy2
		C107

In addition, hand pollinated U.S. 13, NE9812, NE9813, and NE9815 were included along with the single crosses.

Work plans for the coming season are pending on a meeting of the Committee for these maturity groups.

Report of the Committee on Uniform Tests of Field Corn Inbreds

H.L. Everett reported that New York and Pennsylvania screened 67 lines in 1952. Seed of many of these is available in single cross combinations.

R. G. Rothgeb presented the following report on the observation of inbred lines submitted by the Northeastern Conference for testing in Maryland in 1952.

Small seed samples of originators' stocks were divided into two lots. One lot was planted in the corn nursery of the Maryland station near College Park, and the other lot in the U. S. Department of Agriculture leaf blight nursery at Beltsville, Maryland.

At both locations the stand varied widely for the several inbreds, and in some cases it was very inadequate. In the Maryland station nursery the number of plants varied from 3 to 32 with 8 of the 13 lines having less than 12 plants upon which to make observations. The surviving plants exhibited fairly normal development with little stalk rot or other more obvious diseases. As a result only a few general observations appeared worth recording. These observations together with the leaf blight ratings from Beltsville are tabulated below.

The leaf blight ratings are also recorded in mimeo 24500, December 1952, Division of Cereal Crops and Diseases of the U. S. Department of Agriculture, entitled "Helminthosporium turcicum and Helminthosporium maydis Leaf Blight Ratings on Corn at Plant Industry Station, Beltsville, Maryland 1952." Epidemics of the two diseases were induced by repeated inoculations with composited cultures, together with the placing of infected dried corn leaves in the rows of a susceptible hybrid planted at regular intervals in the nursery to act as a spreader. Due to warm and very dry weather during July infection spread very slowly. More humid conditions during early August caused considerable infection by late August. A heavy infection was present when the September readings were made. It would appear, therefore, that the ratings obtained should be quite indicative of the relative resistance of the lines tested.

At College Park Oh45 was easily the most outstanding line for general field performance despite its poor turcicum rating at Beltsville, Inbred Cl03 performed well and also had the best rating for both H. turcicum and H. maydis. In past years this line consistently has been one of the best for vigor and freedom from disease at College Park.

Performance of Inbred Lines

Inbred	College Park		U.S.D.A. Beltsville Station				
	'Relative' Stalk	'Grain'	Root	'Mean leaf blight ratings			
	height	'strength'	yield	'lodging'	H. turcicum	'H. maydis	
				pct.	8/27	9/27	9/2
C103	L317	Strong	Good	14	0.8	2.0	0.2
C107	L317	Weak	"	0	5.0	5.0	1.5
Hy		Med.	"	0	3.0	5.0	3.0
Hy1	L317	Strong	Med.	0	1.5	2.5	3.0
Hy2	WF9	"	"	0	3.0	4.5	2.5
WF9		Strong	Good	0	1.0	3.0	3.0
38-11	L317	Med.	Med.	0	2.5	3.5	1.3
B10	WF9	Strong	Poor	0	2.0	4.5	3.5
L317		Weak	"	0	1.0	2.0	5.0
K171	L317	Med.	Med.	0	1.0	3.5	3.0
K214	L317	"	Poor	18	2.5	4.0	2.5
J7-269	Hy	"	Good	24	5.0	5.0	1.5
Oh41	WF9	"	Med.	0	1.0	3.0	3.5
Oh43	WF9	Strong	Good	0	2.5	2.5	.5
Oh45	WF9	Strong	Good	0	3.0	5.0	2.0
Pa83C	Hy	"	"	3	2.5	4.5	1.0
Pa92D	WF9	Med.	"	50	2.0	5.0	2.5
W102	WF9	Strong	Med.	0	5.0	5.0	3.0
Average					2.46	3.86	2.36

A further extension of inbred observation trials following the procedure as outlined in the 1952 report was agreed upon. New York will continue to serve as procurement agent for the Conference. Requests should be sent to Dr. H. L. Everett early so as to allow ample time for assembling and distributing the seed.

Report of the Committee on Registration of Eastland
Hybrids

This committee had nothing new to report.

H. M. Yegian proposed that -

NE9203 (Ms1341 x A96) x (NH500 x SD105) be tested as a candidate for an Eastland designation.

This hybrid had a predicted yield in 1949 of 87.9 bushels per acre and silking date of 65 days. Its predicted moisture in grain at harvest did not differ appreciable from that of other hybrids in the same test. In yield trials NE9203 has outyielded W240 by about 20 bushels per acre. Seed has been produced on a commercial basis by Eastern States Farmers' Exchange. About 500 pounds is available for testing purposes.

Tests were assigned to the following states. It is anticipated that others also may be interested in testing this hybrid.

Connecticut
Maine
Maryland

New Hampshire (possibly)
New York
Pennsylvania

Report of the Committee on Cold Tests

The Committee had no formal report to present at this time.

H. L. Everett

MOVED: this Committee be changed.

Seconded and passed

The following members were appointed to serve on the Committee on Cold Tests. Dr. Wernham will continue as Chairman of this Committee:-

W. L. Haltiwanger
C. W. Boothruyd
C. C. Wernham, Chairman

Report of Committee on Sweet Corn Investigations

Two states, Maine and New Jersey, submitted seed of sweet corn hybrids for testing and observation in 1952. Maine supplied seed of hybrids Me 14251, Me 14651, and Me 14751, and New Jersey supplied seed of N.J. 101, N.J. 106, N.J. 107, and N.J. 108.

Four stations, namely, Delaware, Maryland, New Jersey, and New York (Geneva) made tabulated reports on the performance of the exchanged hybrids. A composited summary of these reports is presented below.

Maryland, New Jersey and New York reported seasonal conditions - slow emergence and drought - which limited the development of the crop. In general there was reasonable agreement among the reporting stations in regard to the relative performance of the several hybrids.

Composited Data and Observations From Four Northeastern State Experiment Stations Reporting on the Performance of Exchanged Sweet Corn Hybrids in 1952

A. Plant Characteristics

Hybrid	Dif. in days to mid-silk ¹	Av. hght. ins. ²	No. tillers ³	General vigor ⁴	Yield score ⁵	Death by wilt ⁴	Leaf blight score ⁴	Comment
N.J. 106	0	61	Few	Med.	3.7*	0	3*	
N.J. 107	+2	64	Med.	Med.	4	0	3	
N.J. 101	+2	67	Few	Good	1	0	1	Light smut
Me.14251	+2	58	Med.	Med.	4	14	4	Heavy "
Me.14751	+3	57	Med.	Poor	4.5	2	3	
N.J. 108	+3	62	Few	Good	2.7	0	1	
Me.14651	+7	59	Few	Poor	5	22	5	
Gol.Cr.B.Check	+3	--	Many	Good	-	0	3	

B. Ear Characteristics

Hybrid	Ear length ins. ⁵	Ear diameter ins. ⁵	No. kernel rows ⁶	Flavor score ²	Tenderness score ²	Comment
N.J. 106	8.5	1.71	8-12-14	3.3*	3.3*	
N.J. 107	7.7	1.69	-12-16	3	3	Poorly filled (5)
N.J. 101	8.0	1.69	10-12-16	3	3	
Me.14251	7.4	1.64	-12-16	3.2	3.3	
Me.14751	8.6	1.65	-12-14	2	2.3	
N.J. 108	8.4	1.73	-12-16	2.2	3	Poor tip cover
Me.14651	8.2	1.65	-12-14	2.8	2.5	

* Score of 1 is most desirable; 5, least desirable. 1 Md. and N.J.
2 Del., Md., N.J., N.Y. 3 Md. and N.Y. 4 Md. 5 Md., N.J., N.Y. 6 Del.,
Md. N.Y. P. C. Rothbach, Chairman

Activities for 1953 will depend on answers to a questionnaire being sent to the sweet corn committee members.

Following presentation of the report Dr. Rothgeb
MOVED: That the chairmanship of the sweet corn committee be changed.

Seconded and passed

R. S. Snell nominated D. W. Barton to be the new chairman of the sweet corn committee.

Seconded and passed

Discussion of Maize Germ Plasm Situation

Following reports from standing committees Chairman Everett asked G. H. Stringfield to discuss the activities of the Committee on Preservation of Indigenous Strains of Maize.

Mr. Stringfield stated this committee was organized in 1951 by the National Research Council to direct a project for the collection and preservation of strains of maize indigenous to the Americas. This work is carried on in cooperation with the Rockefeller Foundation.

Efforts so far have been largely devoted to the collection of varieties native to Latin America. Much of this material was in real danger of becoming extinct. In addition considerable interest in it existed among anthropologists, corn breeders and geneticists alike.

Several State Agricultural Experiment Stations in the Corn Belt have already undertaken the responsibility of maintaining viable stocks of locally adapted open pollinated varieties. This work has been seriously hampered by lack of adequate storage facilities.

At the time this Committee was organized about 2000 samples, mostly from Mexico and Central America had been collected and were in cold storage at Chapingo, Mexico. These collections were made largely through the efforts of Drs. E. J. Wellhausen, J. G. Harrar and L. H. Roberts of the Rockefeller Foundation.

Collections are made in accordance with recommendations from the Committee. A minimum of two ears and usually more are taken for each collection. The seed is divided into two lots. One lot is retained in cold storage at one of the Latin American storage centers and the other (about 5 grams) is sent to U. S. Department of Agriculture Center, Glendale, Maryland for stand-by storage.

At present there are three Latin American Storage Centers located at: Medellin, Columbia; Piracicaba, Brazil and Chapingo, Mexico. Point of location of the collection determines to which center seed will be sent for storage.

About 12 collectors are working at present. The number of varieties sampled to date runs up into the several thousands. At the present rate 1953 should complete collection of most of the corn families of South America.

It is anticipated that eventually most of the collections can be grouped into relatively small numbers of kinds of families or races. This will greatly facilitate their maintenance. Under ideal storage conditions it will be possible to maintain viable seed stocks for 15 to 25 years.

A major portion of the work of this Committee has been handled by the Executive Committee composed of: R. E. Clelland, Chairman; C. Horn, P. C. Mangelsdorf and C. O. Erlanson.

Considerable discussion followed Mr. Stringfield's remarks concerning additional areas where valuable maize germ plasm may be found.

W. R. Singleton described a group of corns from Turkey obtained from the Plant Introduction Station at Glendale, Md. These varied all the way from extremely early flints to late dents. About 30 percent of the selfs in this material were found to segregate for easily recognizable genetic characters.

J. E. Wright mentioned the collection of Argentine corns being maintained at the Primary Plant Introduction Garden, Ames, Iowa. Although no comprehensive collection is maintained the collections include a number of strains from latitudes this conference is interested in.

The strong, extensive root systems found in Mexican corns was mentioned as was the fact that good sources of germ plasm exist in Asia and Africa.

J. E. Wright briefly discussed the North Central Region maize genetics project due to start this year. Dr. M. M. Rhoades has been put in charge of the project and has already devoted considerable time and effort to it. The genetic stocks will be grown at the University of Illinois. Objectives include collection, evaluation,

maintainance and preservation of genetic and chromosomal tester stocks. New tester stocks will be synthesized by bringing together combinations of genes into a single line. Considerable effort will be devoted to adapting genetic testers for use in the Corn Belt states. Linkage data will be obtained and revised through cooperative efforts of interested breeders and geneticists.

It was emphasized that Dr. Rhoades is most interested in obtaining genetic stocks that anyone may have.

R. S. Snell brought up the question concerning maintaining the germ plasm in sweet corn. Methods by which this might be best accomplished were discussed. It was suggested that this was a job for a committee similar to the field corn germ plasm committee of the North Central Conference.

Experiments on Stalk Rot at Aurora, N. Y.

C. W. Boothruyd reported one year's results of experiments conducted at Aurora, New York to study the relationship of potassium to stalk rot. All plots received a uniform application of fertilizer prior to planting. Under conditions of natural infection six plants were scored in the two middle rows of each plot. On the basis of stalk rot ratings of 0 for no infection to 4 for maximum infection degrees of infection and yields obtained from the various combinations of nitrogen and potassium were as follows:

<u>Fertilizer applica-</u> <u>tion at planting</u>	<u>Last</u> <u>Cultivation</u>	<u>Yield</u> <u>Bu/A</u>	<u>Infection</u> <u>index</u>
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Susceptible Hybrid

N	O	57.1	2.50
N	N	68.1	3.49
NK	O	56.8	1.60
NK	NK	84.3	3.07

Resistant Hybrid

N	O	70.8	1.71
N	N	73.9	2.71
NK	O	56.8	1.56
NK	NK	92.9	1.98

Report of the Nominating Committee

The Nominating Committee composed of D. F. Jones, R. G. Rothgeb and R. S. Snell was asked to report. The Committee nominated C. C. Wernham as Vice Chairman for the ensuing year. Following the Committees' report it was

MOVED: That nominations be closed and the secretary be instructed to cast a unanimous ballot for Dr. Wernham.

Seconded and passed

Meeting adjourned at 12:30 p. m.

ROSTER OF ATTENDANCE

Connecticut

Jones, D. F.	Connecticut Agr. Expt. Sta.	New Haven
Stinson, H. T.	" " " "	"

Maryland, USDA

Robert, Alice L.	Plant Industry Station	Beltsville
Findley, Wm. R., Jr.	" " "	"
Rothgeb, R. G.	Maryland Agri. Expt. Sta.	College Park

Massachusetts

Yegian, H. M.,	Massachusetts Agri. Expt. Sta.	Amherst
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New Hampshire

Higgins, Leroy J.	New Hampshire Agri. Expt. Sta.	Durham
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New Jersey

Snell, Robert S.	New Jersey Agri. Expt. Sta.	New Brunswick
Baylor, John E.	" " " " "	" "
Ahlgren, Gilbert H.	" " " " "	" "
Stults, Clifford C.	" " " " "	" "

New York

Everett, H. L.	New York Agri. Expt. Sta.	Ithaca
Boothroyd, Carl W.	" " " " "	"
Randolph, R. F.	" " " " "	"
Otto, H. J.	" " " " "	"
Barton, Donald W.	" " " " "	Geneva
Singleton, W. Ralph	Brookhaven Nat'l. Laboratory	Long Island

Ohio

Stringfield, G. H.	Ohio Agri. Expt. Sta.	Wooster
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Pennsylvania

Wernham, C. C.	Pennsylvania Agri. Expt. Sta.	State College
Coon, B. F.	" " " "	" "
Wright, Jas. E., Jr.	" " " "	" "

West Virginia

Haltiwanger, Wm. L.	West Virginia Agri. Expt. Sta.	Morgantown
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OFFICERS AND COMMITTEE MEMBERSHIP, 1953

Referee - A. J. Heinicke

Executive Committee

Chairman	H. L. Everett
Vice Chairman	C. C. Wernham
Member-at-large	H. M. Yegian
Secretary	M. T. Jenkins

Committee on Uniform Tests of Double Crosses

L. L. Huber, Chairman
B. F. Coon
H. L. Everett
C. M. Haenseler
R. S. Wiggins

Committee on the Registration of "Eastland" Hybrids

D. F. Jones, Chairman
L. L. Huber
R. G. Rothgeb

Committee on Sweet Corn Investigations

D. W. Barton, Chairman
R. G. Rothgeb
R. M. Bailey
W. H. Lachman
M. T. Lewis
W. R. Singleton
R. S. Snell

Committee on Statistical Designs for the Uniform Comparisons

C. E. Phillips, Chairman
C. I. Bliss
H. M. Yegian

Committee on Cold Tests

C. C. Wernham, Chairman
C. W. Boothruyd
W. L. Haltiwanger

Committee on Uniform Tests of Field Corn Inbreds

L. L. Huber, Chairman
C. M. Haenseler
R. G. Wiggans

Committee on Uniform Tests of Single Crosses

W240 Maturity	H. M. Yegian, Chairman
	R. M. Bailey
W355, W412 and M15 Maturities	L. L. Huber, Chairman
	R. G. Wiggans
	H. M. Yegian
K24 and Ia.4059 Maturities	D. F. Jones
U.S. 13 and Ill. 448 Maturities	J. C. Anderson, Chairman
	R. G. Rothgeb

LIST OF NORTHEASTERN EXPERIMENT STATIONS

Connecticut
Delaware
Maine
Massachusetts
Maryland
New Hampshire

New Jersey
New York
Pennsylvania
Rhode Island
Vermont
West Virginia

THE HISTORY OF THE UNITED STATES

OF THE
NORTH AMERICAN CONTINENT
FROM THE FIRST DISCOVERY
TO THE PRESENT TIME

BY JOHN F. JOHNSON

Author of
"The History of the United States of America,"
"The History of the United States of America,"

and
"The History of the United States of America,"
"The History of the United States of America,"

and
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THE HISTORY OF THE UNITED STATES

OF THE	OF THE
NORTH AMERICAN	NORTH AMERICAN
CONTINENT	CONTINENT
FROM THE FIRST	FROM THE FIRST
DISCOVERY	DISCOVERY
TO THE PRESENT	TO THE PRESENT
TIME	TIME